

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2003-0077
FOR
UNIVERSITY OF CALIFORNIA, DAVIS
FOR
UC DAVIS CLASS III LANDFILL
CONSTRUCTION, POST-CLOSURE MAINTENANCE AND CORRECTIVE ACTION
YOLO COUNTY

Compliance with this Monitoring and Reporting Program, with Title 27, California Code of Regulations, Section 20005, et seq. (hereafter Title 27), and with the *Standard Provisions and Reporting Requirements for Waste Discharge Requirements for Nonhazardous Solid Waste Discharges Regulated by Title 27 and/or Subtitle D (27 CCR §20005 et seq. and 40 CFR 258)*, dated April 2000, is ordered by Waste Discharge Requirements Order No. R5-2003-0077.

A. REQUIRED MONITORING REPORTS

<u>Report</u>	<u>Due</u>
1. Groundwater Monitoring (Section D.1)	See Table I
2. Annual Monitoring Summary Report (Order No. R5-2003-0077, H.6.)	Annually
3. Corrective Action Progress Report (Order No. R5-2003-0077, I.14.C)	Semi-Annually
4. Unsaturated Zone Monitoring (Section D.2)	See Table II
5. Leachate Monitoring (Section D.3)	See Table III
6. Surface Water Monitoring (Section D.4)	See Table IV
7. Facility Monitoring (Section D.5)	As necessary
8. Response to a Release (Standard Provisions and Reporting Requirements)	As necessary

B. REPORTING

The Discharger shall report monitoring data and information as required in this Monitoring and Reporting Program and as required in Order No. R5-2003-0077 and the Standard Provisions and Reporting Requirements. Reports which do not comply with the required format will be REJECTED and the Discharger shall be deemed to be in noncompliance with the waste discharge requirements. In reporting the monitoring data required by this program, the Discharger shall arrange the data in tabular form so that the date, the constituents, the concentrations, and the units are readily discernible. The data shall be summarized in such a manner so as to illustrate clearly the compliance with waste discharge requirements or the lack thereof. Data shall also be submitted in a digital format acceptable to the Executive Officer.

Each monitoring report shall include a compliance evaluation summary as specified in H. Reporting Requirements, of Order No. R5-2003-0077.

Field and laboratory tests shall be reported in each monitoring report. Quarterly and annual monitoring reports shall be submitted to the Board in accordance with the following schedule for the calendar period in which samples were taken or observations made.

<u>Sampling Frequency</u>	<u>Reporting Frequency</u>	<u>Reporting Periods End</u>	<u>Report Date Due</u>
Monthly	Quarterly	Last Day of Month	by Quarterly Schedule
Quarterly	Quarterly	31 March	30 April
		30 June	31 July
		30 September	31 October
		31 December	31 January
Annually	Annually	30 June	31 July

The Discharger shall submit an **Annual Monitoring Summary Report** to the Board covering the previous monitoring year. The annual report shall contain the information specified in H. Reporting Requirements, of Order No. R5-2003-0077, and a discussion of compliance with the waste discharge requirements and the water quality protection standard.

The results of any monitoring conducted more frequently than required at the locations specified herein or by the waste discharge requirements shall be reported to the Board.

C. WATER QUALITY PROTECTION STANDARD AND COMPLIANCE PERIOD

1. **Water Quality Protection Standard Report**

For each waste management unit (Unit), the Water Quality Protection Standard shall consist of all constituents of concern, the concentration limit for each constituent of concern, the point of compliance, and all water quality monitoring points.

The Discharger shall submit a proposed Water Quality Protection Standard for inorganic waste constituents for Executive Officer review and approval within one year from the date of adoption of this Monitoring and Reporting Program by the Board. The Executive Officer shall review the data and the proposed water quality protection standard in determining the final water quality protection standard for each monitored medium.

The report shall:

- a. Identify **all distinct bodies of surface and ground water** that could be affected in the event of a release from a Unit or portion of a Unit. This list shall include at least the uppermost aquifer and any permanent or ephemeral zones of perched groundwater underlying the facility.
- b. Include a map showing the monitoring points and background monitoring points for the surface water monitoring program, groundwater monitoring program, and the unsaturated zone monitoring program. The map shall include the point of compliance in accordance with §20405 of Title 27.
- c. Evaluate the perennial direction(s) of groundwater movement within the uppermost groundwater zone(s).

If subsequent sampling of the background monitoring point(s) indicates significant water quality changes due to either seasonal fluctuations or other reasons unrelated to waste management activities at the site, the Discharger may request modification of the water quality protection standard.

2. **Constituents of Concern**

The constituents of concern include all the waste constituents, their reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the Unit. The constituents of concern for all Units at the facility are those listed in Table VI. The Discharger shall monitor all constituents of concern in Table VI every five years, or more frequently as required in accordance with a Corrective Action Program.

- a. **Monitoring Parameters**

Monitoring parameters are constituents of concern that are the waste constituents, reaction products, hazardous constituents, and physical parameters that provide a reliable indication of a release from a Unit. The monitoring parameters for all Units are those listed in Tables I through V for the specified monitored medium.

3. Concentration Limits

For a naturally occurring constituent of concern, the concentration limit for each constituent of concern shall be determined as follows:

- a. by calculation in accordance with a statistical method pursuant to §20415 of Title 27; or
- b. by a method acceptable to the Executive Officer in accordance with §20415 of Title 27.

4. Point of Compliance

The point of compliance for the water standard at each Unit is a vertical surface located at the hydraulically downgradient limit of the Unit that extends through the uppermost aquifer underlying the Unit.

5. Compliance Period

The compliance period for each Unit shall be the number of years equal to the active life of the Unit plus the closure period. The compliance period is the minimum period during which the Discharger shall conduct a water quality monitoring program subsequent to a release from the Unit. The compliance period shall begin anew each time the Discharger initiates an evaluation monitoring program.

D. MONITORING

The Discharger shall comply with the detection monitoring program provisions of Title 27 for groundwater, surface water, and the unsaturated zone, in accordance with Detection Monitoring Specification G.2 and G.5 of Waste Discharge Requirements, Order No. R5-2003-0077. Detection monitoring for a new facility, a new Unit, or an expansion of an existing Unit shall be installed, operational, and the first round of samples collected from the detection monitoring wells **prior to** the discharge of wastes. At least one year of data shall be collected from the background well(s) **prior to** the discharge of wastes. All monitoring shall be conducted in accordance with a Sample Collection and Analysis Plan, which includes quality assurance/quality control standards, that is acceptable to the

Executive Officer.

All point of compliance monitoring wells established for the detection monitoring program shall constitute the monitoring points for the groundwater Water Quality Protection Standard. All detection monitoring program groundwater monitoring wells, unsaturated zone monitoring devices, leachate, and surface water monitoring points shall be sampled and analyzed for monitoring parameters and constituents of concern as indicated and listed in Tables I through IV.

Method detection limits and practical quantitation limits shall be reported. All peaks shall be reported, including those which cannot be quantified and/or specifically identified. Metals shall be analyzed in accordance with the methods listed in Table VI.

The Discharger may use alternative analytical test methods, including new USEPA approved methods, provided the methods have method detection limits equal to or lower than the analytical methods specified in this Monitoring and Reporting Program.

1. Groundwater

The Discharger shall install and operate a groundwater detection monitoring system that complies with the applicable provisions of §20415 and §20420 of Title 27 in accordance with a Detection Monitoring Program approved by the Executive Officer. The Discharger shall collect, preserve, and transport groundwater samples in accordance with the approved Sample Collection and Analysis Plan.

The Discharger shall determine the groundwater flow rate and direction in the uppermost aquifer and in any zones of perched water and in any additional zone of saturation monitored pursuant to this Monitoring and Reporting Program, and report the results quarterly, including the times of highest and lowest elevations of the water levels in the wells.

Hydrographs of each well shall be submitted showing the elevation of groundwater with respect to the elevations of the top and bottom of the screened interval and the elevation of the pump intake. Hydrographs of each well shall be prepared quarterly and submitted annually.

Groundwater samples shall be collected from the point-of-compliance wells, background wells, and any additional wells added as part of the approved groundwater monitoring system. A list of existing detection and corrective action groundwater monitoring wells for the landfill as of the adoption of this

Monitoring and Reporting Program is as follows:

A-Zone Wells:

MW-2, MW-3, MW-4, MW-6, MW-7, MW-8 (background), MW-9, MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, MW-16, MW-17, MW-34, MW-35

B-Zone Wells:

MW-10B, MW-16B, MW-17B, MW-18B, MW-19B, MW-20B, MW-23B, MW-24B, MW-25B, MW-26B, MW-27B, MW-28B, MW-29B, MW-30B, MW-31B, MW-32B, MW-33B

C-Zone Wells:

MW-16C, MW-18C, MW-19C, MW-20C, MW-21C, MW-22C

Samples shall be collected and analyzed for the monitoring parameters in accordance with the methods and frequency specified in Table I.

The monitoring parameters shall also be evaluated annually with regards to the cation/anion balance, and the results shall be graphically presented using a Stiff diagram, a Piper graph, or a Schueller plot. Samples for the constituents of concern specified in Table I shall be collected and analyzed in accordance with the methods listed in Table VI every five years.

2. Unsaturated Zone Monitoring

The Discharger shall install and operate an unsaturated zone detection monitoring system that complies with the applicable provisions of §20415 and §20420 of Title 27 in accordance with a detection monitoring plan approved by the Executive Officer. The Discharger shall collect, preserve, and transport samples in accordance with the quality assurance/quality control standards contained in the approved Sample Collection and Analysis Plan.

Unsaturated zone samples shall be collected from the monitoring devices and background monitoring devices of the approved unsaturated zone monitoring system. The collected samples shall be analyzed for the listed constituents in accordance with the methods and frequency specified in Table II. All monitoring parameters shall be graphed so as to show historical trends at each monitoring point. Samples for the constituents of concern specified in Table II shall be collected and analyzed in accordance with the methods listed in Table VI every five years.

The pan lysimeters, leak detection layer sumps, or other unsaturated zone

monitoring devices shall be checked monthly for liquid and monitoring shall also include the total volume of liquid removed from the system. Unsaturated zone monitoring reports shall be included with the corresponding quarterly groundwater monitoring and shall include an evaluation of potential impacts of the facility on the unsaturated zone and compliance with the Water Quality Protection Standard.

3. Leachate Monitoring

All Unit leachate collection and removal system sumps shall be inspected weekly for leachate generation. Upon detection of leachate in a previously dry leachate collection and removal system, leachate shall be sampled **immediately** and analyzed for the constituents listed in Table III, and then sampled and analyzed quarterly thereafter. Leachate samples shall be collected and analyzed for the listed constituents in accordance with the methods and frequency specified in Table III. The constituents of concern list shall include all constituents listed in Table VI. The quantity of leachate pumped from each sump shall be measured and reported monthly as Leachate Flow Rate (in gallons).

Leachate which seeps to the surface from the Unit shall be sampled and analyzed for the constituents listed in Table III upon detection. The quantity of leachate shall be *estimated* and reported as Leachate Flow Rate (in gallons/day).

4. Surface Water Monitoring

The Discharger shall perform surface water monitoring where appropriate that complies with the applicable provisions of §20415 and §20420 of Title 27.

Samples shall be collected from background surface water monitoring point SW-1 and detection surface water monitoring point SW-2, each located in Putah Creek, and analyzed for the monitoring parameters in accordance with the methods and frequency specified in Table IV. All surface water monitoring samples shall be collected and analyzed for the constituents of concern specified in Table IV every five years. All monitoring parameters shall be graphed so as to show historical trends at each sample location.

5. Facility Monitoring

a. Facility Inspection

Annually, prior to the anticipated rainy season, but no later than **30 September**, the Discharger shall conduct an inspection of the facility. The inspection shall assess damage to the drainage control system, groundwater monitoring equipment (including wells, etc.), and shall include the Standard Observations contained in section H.4.f. of Order No. R5-2003-0077. Any necessary construction, maintenance, or repairs shall be completed by **31 October**. By **15 November** of each year, the Discharger shall submit an annual report describing the results of the inspection and the repair measures implemented.

b. Storm Events

The Discharger shall inspect all precipitation, diversion, and drainage facilities for damage **within 7 days** following *major storm events*. Necessary repairs shall be completed **within 30 days** of the inspection. The Discharger shall report any damage and subsequent repairs within 45 days of completion of the repairs.

The Discharger shall implement the above monitoring program on the effective date of this Program.

Ordered by: _____
THOMAS R. PINKOS, Executive Officer

25 April 2005
(Date)

WLB

TABLE I
GROUNDWATER MONITORING PROGRAM

<u>Parameter</u>	<u>Units</u>	<u>Frequency</u>
Field Parameters		
Groundwater Elevation	Ft. & hundredths, M.S.L.	Quarterly
Temperature	°C	Quarterly ¹
Electrical Conductivity	µmhos/cm	Quarterly ¹
pH	pH units	Quarterly ¹
Turbidity	Turbidity units	Quarterly ¹
Monitoring Parameters		
Total Dissolved Solids (TDS)	mg/L	Semiannually ^{1,2}
Chloride	mg/L	Semiannually ^{1,2}
Carbonate	mg/L	Semiannually ^{1,2}
Bicarbonate	mg/L	Semiannually ^{1,2}
Nitrate - Nitrogen	mg/L	Semiannually ^{1,2}
Sulfate	mg/L	Semiannually ^{1,2}
Calcium	mg/L	Semiannually ^{1,2}
Magnesium	mg/L	Semiannually ^{1,2}
Potassium	mg/L	Semiannually ^{1,2}
Sodium	mg/L	Semiannually ^{1,2}
Volatile Organic Compounds (VOCs) (USEPA Method 8260, see Table V)	µg/L	Semiannually ^{1,2,3}
Constituents of Concern (see Table VI)		
Total Organic Carbon	mg/L	5 years
Inorganics (dissolved)	mg/L	5 years
Volatile Organic Compounds (USEPA Method 8260, extended list)	µg/L	5 years
Semi-Volatile Organic Compounds (USEPA Method 8270)	µg/L	5 years
Chlorophenoxy Herbicides (USEPA Method 8150)	µg/L	5 years
Organophosphorus Compounds (USEPA Method 8141)	µg/L	5 years

¹ Monitoring wells MW-3, MW-6, MW-12 and MW-13 shall be monitored annually.

² Monitoring wells MW-34, MW-35 and any future groundwater detection monitoring wells installed to monitor WMU-2 shall be monitored **quarterly**.

³ Except for MW-9, monitoring wells that are located east of County Road 98 shall be monitored for VOCs by USEPA Method 601 **quarterly** for three quarters and by USEPA Method 8260 **annually** for one quarter during each calendar year.

TABLE II
UNSATURATED ZONE DETECTION MONITORING PROGRAM

SOIL-PORE GAS

<u>Parameter</u>	<u>Units</u>	<u>Frequency</u>
Monitoring Parameters		
Volatile Organic Compounds (USEPA Method TO-14)	µg/cm ³	Quarterly
Methane	%	Quarterly

PAN LYSIMETERS (or other vadose zone monitoring device)

<u>Parameter</u>	<u>Units</u>	<u>Frequency</u>
Field Parameters		
Electrical Conductivity	µmhos/cm	Quarterly
pH	pH units	Quarterly

Monitoring Parameters

Total Dissolved Solids (TDS)	mg/L	Quarterly
Chloride	mg/L	Quarterly
Carbonate	mg/L	Quarterly
Bicarbonate	mg/L	Quarterly
Nitrate - Nitrogen	mg/L	Quarterly
Sulfate	mg/L	Quarterly
Calcium	mg/L	Quarterly
Magnesium	mg/L	Quarterly
Potassium	mg/L	Quarterly
Sodium	mg/L	Quarterly
Volatile Organic Compounds (USEPA Method 8260, see Table V)	µg/L	Quarterly

Constituents of Concern (see Table VI)

Total Organic Carbon	mg/L	5 years
Inorganics (dissolved)	mg/L	5 years
Volatile Organic Compounds (USEPA Method 8260, extended list)	µg/L	5 years

TABLE II
UNSATURATED ZONE DETECTION MONITORING PROGRAM

Continued

<u>Parameter</u>	<u>Units</u>	<u>Frequency</u>
Semi-Volatile Organic Compounds (USEPA Method 8270)	µg/L	5 years
Chlorophenoxy Herbicides (USEPA Method 8150)	µg/L	5 years
Organophosphorus Compounds (USEPA Method 8141)	µg/L	5 years

TABLE III
LEACHATE DETECTION MONITORING PROGRAM

<u>Parameter</u>	<u>Units</u>	<u>Frequency</u>
Field Parameters		
Total Flow	Gallons	Monthly
Flow Rate	Gallons/Day	Monthly
Electrical Conductivity	µmhos/cm	Monthly
pH	pH units	Monthly
Monitoring Parameters		
Total Dissolved Solids (TDS)	mg/L	Quarterly
Chloride	mg/L	Quarterly
Carbonate	mg/L	Quarterly
Bicarbonate	mg/L	Quarterly
Nitrate - Nitrogen	mg/L	Quarterly
Sulfate	mg/L	Quarterly
Calcium	mg/L	Quarterly
Magnesium	mg/L	Quarterly
Potassium	mg/L	Quarterly
Sodium	mg/L	Quarterly
Volatile Organic Compounds (USEPA Method 8260, see Table V)	µg/L	Quarterly
Constituents of Concern (see Table VI)		
Total Organic Carbon	mg/L	5 years
Inorganics (dissolved)	mg/L	5 years
Volatile Organic Compounds (USEPA Method 8260, extended list)	µg/L	5 years
Semi-Volatile Organic Compounds (USEPA Method 8270)	µg/L	5 years
Chlorophenoxy Herbicides (USEPA Method 8150)	µg/L	5 years
Organophosphorus Compounds (USEPA Method 8141)	µg/L	5 years

TABLE IV
SURFACE WATER DETECTION MONITORING PROGRAM

<u>Parameter</u>	<u>Units</u>	<u>Frequency</u>
Field Parameters		
Temperature	°C	Quarterly
Electrical Conductivity	µmhos/cm	Quarterly
pH	pH units	Quarterly
Turbidity	Turbidity units	Quarterly
Monitoring Parameters		
Total Dissolved Solids (TDS)	mg/L	Quarterly
Carbonate	mg/L	Quarterly
Bicarbonate	mg/L	Quarterly
Chloride	mg/L	Quarterly
Nitrate - Nitrogen	mg/L	Quarterly
Sulfate	mg/L	Quarterly
Calcium	mg/L	Quarterly
Magnesium	mg/L	Quarterly
Potassium	mg/L	Quarterly
Sodium	mg/L	Quarterly
Volatile Organic Compounds (USEPA Method 8260, see Table V)	µg/L	Quarterly
Constituents of Concern (see Table VI)		
Total Organic Carbon	mg/L	5 years
Inorganics (dissolved)	mg/L	5 years
Volatile Organic Compounds (USEPA Method 8260, extended list)	µg/L	5 years
Semi-Volatile Organic Compounds (USEPA Method 8270)	µg/L	5 years
Chlorophenoxy Herbicides (USEPA Method 8150)	µg/L	5 years
Organophosphorus Compounds (USEPA Method 8141)	µg/L	5 years

TABLE V
MONITORING PARAMETERS FOR DETECTION MONITORING

Surrogates for Metallic Constituents:

pH
Total Dissolved Solids
Electrical Conductivity
Chloride
Sulfate
Nitrate nitrogen

Constituents included in VOC:

USEPA Method 8260

Acetone
Acrylonitrile
Benzene
Bromochloromethane
Bromodichloromethane
Bromoform (Tribromomethane)
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane (Ethyl chloride)
Chloroform (Trichloromethane)
Dibromochloromethane (Chlorodibromomethane)
1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dibromoethane (Ethylene dibromide; EDB)
o-Dichlorobenzene (1,2-Dichlorobenzene)
p-Dichlorobenzene (1,4-Dichlorobenzene)
trans-1,4-Dichloro-2-butene
1,1-Dichloroethane (Ethylidene chloride)
1,2-Dichloroethane (Ethylene dichloride)
1,1 -Dichloroethylene (1,1 -Dichloroethene; Vinylidene chloride)
cis- 1,2-Dichloroethylene (cis- 1,2-Dichloroethene)
trans-1,2-Dichloroethylene (trans-1,2-Dichloroethene)
1,2-Dichloropropane (Propylene dichloride)
cis- 1,3-Dichloropropene
trans- 1,3-Dichloropropene
Ethylbenzene
2-Hexanone (Methyl butyl ketone)
Methyl bromide (Bromomethane)

TABLE V
MONITORING PARAMETERS FOR DETECTION MONITORING
Continued

Methyl chloride (Chloromethane)
Methylene bromide (Dibromomethane)
Methylene chloride (Dichloromethane)
Methyl ethyl ketone (MEK: 2-Butanone)
Methyl iodide (Iodomethane)
4-Methyl-2-pentanone (Methyl isobutylketone)
Styrene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethylene (Tetrachloroethene; Perchloroethylene)
Toluene
1,1,1-Trichloroethane (Methylchloroform)
1,1,2-Trichloroethane
Trichloroethylene (Trichloroethene)
Trichlorofluoromethane (CFC- 11)
1,2,3-Trichloropropane
Vinyl acetate
Vinyl chloride
Xylenes

TABLE VI
CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

<u>Inorganics (dissolved):</u>	<u>USEPA Method</u>
Aluminum	6010
Antimony	6010
Barium	6010
Beryllium	6010
Cadmium	6010
Chromium	6010
Cobalt	6010
Copper	6010
Silver	6010
Tin	6010
Vanadium	6010
Zinc	6010
Iron	6010
Manganese	6010
Arsenic	7062
Lead	7421
Mercury	7470
Nickel	7520
Selenium	7742
Thallium	7841
Cyanide	9010
Sulfide	9030

Volatile Organic Compounds:

USEPA Method 8260

Acetone
 Acetonitrile (Methyl cyanide)
 Acrolein
 Acrylonitrile
 Allyl chloride (3-Chloropropene)
 Benzene
 Bromochloromethane (Chlorobromomethane)
 Bromodichloromethane (Dibromochloromethane)
 Bromoform (Tribromomethane)
 Carbon disulfide
 Carbon tetrachloride
 Chlorobenzene
 Chloroethane (Ethyl chloride)
 Chloroform (Trichloromethane)
 Chloroprene
 Dibromochloromethane (Chlorodibromomethane)

TABLE VI

CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

Continued

1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dibromoethane (Ethylene dibromide; EDB)
o-Dichlorobenzene (1,2-Dichlorobenzene)
m-Dichlorobenzene (1,3-Dichlorobenzene)
p-Dichlorobenzene (1,4-Dichlorobenzene)
trans- 1,4-Dichloro-2-butene
Dichlorodifluoromethane (CFC 12)
1,1 -Dichloroethane (Ethylidene chloride)
1,2-Dichloroethane (Ethylene dichloride)
1,1 -Dichloroethylene (1, 1-Dichloroethene; Vinylidene chloride)
cis- 1,2-Dichloroethylene (cis- 1,2-Dichloroethene)
trans- 1,2-Dichloroethylene (trans- 1,2-Dichloroethene)
1,2-Dichloropropane (Propylene dichloride)
1,3-Dichloropropane (Trimethylene dichloride)
2,2-Dichloropropane (Isopropylidene chloride)
1,1 -Dichloropropene
cis- 1,3-Dichloropropene
trans- 1,3-Dichloropropene
Ethylbenzene
Ethyl methacrylate
Hexachlorobutadiene
2-Hexanone (Methyl butyl ketone)
Isobutyl alcohol
Methacrylonitrile
Methyl bromide (Bromomethane)
Methyl chloride (Chloromethane)
Methyl ethyl ketone (MEK; 2-Butanone)
Methyl iodide (Iodomethane)
Methyl methacrylate
4-Methyl-2-pentanone (Methyl isobutyl ketone)
Methylene bromide (Dibromomethane)
Methylene chloride (Dichloromethane)
Naphthalene
Propionitrile (Ethyl cyanide)
Styrene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethylene (Tetrachloroethene; Perchloroethylene; PCE)
Toluene
1,2,4-Trichlorobenzene
1,1,1 -Trichloroethane, Methylchloroform
1,1,2-Trichloroethane
Trichloroethylene (Trichloroethene; TCE)

TABLE VI

CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

Continued

Trichlorofluoromethane (CFC- 11)
1,2,3-Trichloropropane
Vinyl acetate
Vinyl chloride (Chloroethene)
Xylene (total)

Semi-Volatile Organic Compounds:

USEPA Method 8270 - base, neutral, & acid extractables

Acenaphthene
Acenaphthylene
Acetophenone
2-Acetylaminofluorene (2-AAF)
Aldrin
4-Aminobiphenyl
Anthracene
Benzo[a]anthracene (Benzanthracene)
Benzo[b]fluoranthene
Benzo[k]fluoranthene
Benzo[g,h,i]perylene
Benzo[a]pyrene
Benzyl alcohol
Bis(2-ethylhexyl) phthalate
alpha-BHC
beta-BHC
delta-BHC
gamma-BHC (Lindane)
Bis(2-chloroethoxy)methane
Bis(2-chloroethyl) ether (Dichloroethyl ether)
Bis(2-chloro-1-methylethyl) ether (Bis(2-chloroisopropyl) ether; DCIP)
4-Bromophenyl phenyl ether
Butyl benzyl phthalate (Benzyl butyl phthalate)
Chlordane
p-Chloroaniline
Chlorobenzilate
p-Chloro-m-cresol (4-Chloro-3-methylphenol)
2-Chloronaphthalene
2-Chlorophenol
4-Chlorophenyl phenyl ether
Chrysene
o-Cresol (2-methylphenol)
m-Cresol (3-methylphenol)
p-Cresol (4-methylphenol)

TABLE VI

CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

Continued

4,4'-DDD
4,4'-DDE
4,4'-DDT
Diallate
Dibenz[a,h]anthracene
Dibenzofuran
Di-n-butyl phthalate
o-Dichlorobenzene (1,2-Dichlorobenzene)
m-Dichlorobenzene (1,3-Dichlorobenzene)
p-Dichlorobenzene (1,4-Dichlorobenzene)
3,3'-Dichlorobenzidine
2,4-Dichlorophenol
2,6-Dichlorophenol
Dieldrin
Diethyl phthalate
p-(Dimethylamino)azobenzene
7,12-Dimethylbenz[a]anthracene
3,3'-Dimethylbenzidine
2,4-Dimethylphenol (m-Xylenol)
Dimethyl phthalate
m-Dinitrobenzene
4,6-Dinitro-o-cresol (4,6-Dinitro-2-methylphenol)
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Di-n-octyl phthalate
Diphenylamine
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Endrin aldehyde
Ethyl methanesulfonate
Famphur
Fluoranthene
Fluorene
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane

TABLE VI

CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

Continued

Hexachloropropene
Indeno(1,2,3-c,d)pyrene
Isodrin
Isophorone
Isosafrole
Kepone
Methapyrilene
Methoxychlor
3-Methylcholanthrene
Methyl methanesulfonate
2-Methylnaphthalene
Naphthalene
1,4-Naphthoquinone
1-Naphthylamine
2-Naphthylamine
o-Nitroaniline (2-Nitroaniline)
m-Nitroaniline (3-Nitroaniline)
p-Nitroaniline (4-Nitroaniline)
Nitrobenzene
o-Nitrophenol (2-Nitrophenol)
p-Nitrophenol (4-Nitrophenol)
N-Nitrosodi-n-butylamine (Di-n-butylnitrosamine)
N-Nitrosodiethylamine (Diethylnitrosamine)
N-Nitrosodimethylamine (Dimethylnitrosamine)
N-Nitrosodiphenylamine (Diphenylnitrosamine)
N-Nitrosodipropylamine (N-Nitroso-N-dipropylamine; Di-n-propylnitrosamine)
N-Nitrosomethylethylamine (Methylethylnitrosamine)
N-Nitrosopiperidine
N-Nitrosopyrrolidine
5-Nitro-o-toluidine
Pentachlorobenzene
Pentachloronitrobenzene (PCNB)
Pentachlorophenol
Phenacetin
Phenanthrene
Phenol
p-Phenylenediamine
Polychlorinated biphenyls (PCBs; Aroclors)
Pronamide
Pyrene
Safrole
1,2,4,5-Tetrachlorobenzene
2,3,4,6-Tetrachlorophenol

TABLE VI

CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

Continued

o-Toluidine
Toxaphene
1,2,4-Trichlorobenzene
2,4,5-Trichloropheno
2,4,6-Trichlorophenol
0,0,0-Triethyl phosphorothioate
sym-Trinitrobenzene

Chlorophenoxy Herbicides:

USEPA Method 8150

2,4-D (2,4-Dichlorophenoxyacetic acid)
Dinoseb (DNBP; 2-sec-Butyl-4,6-dinitrophenol)
Silvex (2,4,5-Trichlorophenoxypropionic acid; 2,4,5-TP)
2,4,5-T (2,4,5-Trichlorophenoxyacetic acid)

Organophosphorus Compounds:

USEPA Method 8141

0,0-Diethyl 0-2-pyrazinyl phosphorothioate (Thionazin)
Dimethoate
Disulfoton
Methyl parathion (Parathion methyl)
Parathion
Phorate

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2003-0077

WASTE DISCHARGE REQUIREMENTS
FOR
UNIVERSITY OF CALIFORNIA, DAVIS
UC DAVIS CLASS III LANDFILL
CONSTRUCTION, POST-CLOSURE MAINTENANCE AND CORRECTIVE ACTION
YOLO COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Board) finds that:

1. The Regents of the University of California own, and the University of California, Davis operates (jointly hereafter Discharger) the UC Davis Class III Landfill (a municipal solid waste landfill) which is located approximately 3 miles southwest of the City of Davis in Section 24, T8N, R1E, MDB&M, as shown in Attachment A, which is incorporated herein and made part of this Order.
2. The facility consists of one closed unlined waste management unit (WMU-1) covering approximately 23 acres, and a 16 acre expansion (WMU-2) to the west of WMU-1, as shown in Attachment B which is incorporated herein and made part of this Order. The facility is comprised of Assessor's Parcel Number 37-190-09. The total net refuse capacity of WMU-2 is estimated to be 702,736 cubic yards and is expected to reach capacity in the year 2031.
3. The landfill has been in operation since 1966. In the past, the landfill received municipal solid wastes, agricultural wastes, green wastes, animal wastes, construction/ demolition wastes, and inert materials.
4. On 9 August 1996, the Regional Board issued Waste Discharge Requirements (WDRs) Order No. 96-228, in which the facility was classified as a Class III waste disposal site for the discharge of non-hazardous or inert wastes in accordance with the regulations in effect when the order was issued. This Order classifies the Unit(s) as a Class III landfill(s) that accepts municipal solid waste in accordance with Title 27, California Code of Regulations, §20005, et seq. (Title 27).
5. WDRs Order No. 96-228 required the early closure of WMU-1 due to significant groundwater impacts from the Unit. Order No. 96-228 also approved the construction of WMU-2. Subsequent WDRs Order No. 5-00-191 approved the substitution of a geosynthetic clay liner (GCL) in place of the previously approved two-feet of compacted clay for the low permeability layer in the WMU-2 liner.

6. WMU-2 will consist of eight cells. The first cell (Cell 6) was constructed during late 2000 and early 2001. The Discharger proposes to construct Cell 7 and Cell 8 during 2003. WDRs Order No. 5-00-191 approved the liner system design for Cell 6 only. This Order approves the basic liner system design for the remainder of WMU-2.

SITE DESCRIPTION

7. Land within 1,000 feet of the facility is used for irrigated agriculture and University facilities.
8. Soil borings indicate that the surface geology of the WMUs consists of 10 to 15 feet of medium stiff to very stiff, fine sandy silts and loose silty sands of relatively low to very low permeability. Landfill trenches are generally cut through this soil to a depth of approximately 20 feet below ground surface.
9. The entire site is underlain by alluvial fan deposits ranging from clay to gravel. These deposits comprise the Tehama Formation which is approximately 3,000 feet thick in the vicinity of Davis.
10. The measured hydraulic conductivity of the native soils underlying the landfill ranges between 6×10^{-5} and 1×10^{-8} centimeters per second (cm/sec).
11. The closest Holocene fault is the Dunnigan Hills (Zamora) Fault located approximately 12 miles to the northwest. The estimated magnitude of the maximum probable earthquake along this fault is 6.6 on the Richter scale with a resulting maximum probable acceleration of 0.3g at the site. The estimated duration of strong shaking is 12 seconds.
12. The facility receives an average of 16 inches of precipitation per year with evaporation averaging 70 inches per year.
13. The 100-year, 24-hour precipitation event is estimated to be 5.28 inches (California Department of Water Resources, 1976).
14. A portion of the facility is within the 100-year floodplain. However, the projected floodwater level is less than 1 foot in depth and the only anticipated hydrodynamic forces would be from wave action caused by wind across the ponded water. A limited access road, which serves as a berm against floodwaters and prevents inundation or washout of the WMUs due to floods with a 100-year return period, has been built along the northern edge of the facility.

WASTE AND SITE CLASSIFICATION

15. The Discharger proposes to continue discharging municipal solid wastes, which are defined in §20164 of Title 27. Scrap metal, wood, and construction and demolition waste is separated from municipal solid waste and stored at the site until removal. Approximately 30 of the 50 tons of daily waste received at the landfill are landfilled while the remaining wastes are diverted or recycled. The area served by the landfill is property owned and operated by the University of California, Davis.
16. The site characteristics where the landfill is located (see Finding No. 10) do not meet the siting criteria for a new Class III landfill contained in §20260(a) and (b)(1) of Title 27. As such, the site is not suitable for operating new Units or lateral expansions of existing Units for the discharge and containment of Class III wastes without the construction of additional waste containment features in accordance with §20260(b)(2) of Title 27 and State Water Resources Control Board Resolution No. 93-62.

SURFACE AND GROUNDWATER CONDITIONS

17. The *Water Quality Control Plan for the Sacramento River and San Joaquin River Basin Fourth Edition* (hereafter Basin Plan), designates beneficial uses, establishes water quality objectives, and contains implementation plans and policies for all waters of the Basin. This Order implements the Basin Plan.
18. Surface drainage is to Putah Creek which drains into the Yolo Bypass and then into the Sacramento-San Joaquin Delta.
19. The beneficial uses of Putah Creek, as specified in the Basin Plan, are domestic, municipal, and agricultural supply; groundwater recharge; recreation; aesthetic enjoyment; fresh water replenishment; and preservation and enhancement of fish, wildlife and other aquatic resources.
20. The regional groundwater is the lower Cache-Putah Creek Groundwater Basin, and consists of shallow, intermediate and deep aquifers. Local agricultural water is obtained from wells in the shallow and intermediate aquifers that extend to a maximum depth of 650 feet. All domestic water for the university is supplied from wells into the deep (1,100 to 1,500 feet) aquifers. No springs are present within one mile of the site.
21. The groundwater flow direction is generally to the northeast with an average hydraulic gradient of approximately 0.003 feet per foot. The depth to groundwater fluctuates seasonally as much as 15 feet. Groundwater in the first water bearing formation typically resides between 15 and 35 feet below the base of the WMUs. However, groundwater has risen to within 5 feet of the base of proposed WMU-2 during periods of extended heavy rains, although the Discharger has shown that this situation occurs only during exceptionally wet years and is of a very short duration. In order to prevent groundwater

from contacting the bottom of the liner system during periods of extended heavy rains, the Discharger proposes to install a geomembrane layer as a hydraulic barrier at least one foot below the base of the liner system. The Discharger proposes to place fine-grained native soils between the base of the liner system and the hydraulic barrier layer. The Discharger also proposes to install a geocomposite drainage layer above the barrier layer and to slope it to a lysimeter sump to provide leak detection (as discussed in later findings of this Order). As proposed by the Discharger, this Order requires the installation of a hydraulic barrier layer at least one foot below the single composite liner system if two-feet of clay is utilized as the permeability layer, or at least 1.5 feet below the single composite liner system if a GCL is utilized as the low permeability layer.

22. The designated beneficial uses of the groundwater, as specified in the Basin Plan, are domestic and municipal, agricultural, and industrial supply.

GROUNDWATER MONITORING

23. Eighteen groundwater monitoring wells have been placed into the first water bearing formation (A-zone), seventeen monitoring wells are placed in second water bearing zone (B-zone), and six monitoring wells are placed in the third water bearing zone (C-zone) at the site at locations as shown in Attachment B. Groundwater monitoring well MW-8 will serve as the background monitoring well for both WMU-1 and WMU-2.
24. The Discharger is currently engaged in corrective action monitoring downgradient from WMU-1. The Discharger will perform detection monitoring for WMU-2. Detection monitoring specifications are outlined in Detection Monitoring Specifications G.1 through G.24 of these WDRs.
25. Volatile organic compounds (VOCs) are typical waste constituents detected in a release from a landfill, and are the primary waste constituents detected in groundwater beneath a municipal solid waste landfill. Since volatile organic compounds are not naturally occurring and thus have no background value, they are not amenable to the statistical analysis procedures contained in Title 27 for the determination of a release of wastes from a Unit.
26. Sections 20415(e)(8) and (9) of Title 27 provide for the non-statistical evaluation of monitoring data that will provide the best assurance of the earliest possible detection of a release from a Unit in accordance with §20415(b)(1)(B)2.-4. of Title 27. However, Title 27 does not specify a specific method for non-statistical evaluation of monitoring data.
27. The Regional Board may specify a non-statistical data analysis method pursuant to Section 20080(a)(1) of Title 27. Section 13360(a)(1) of the California Water Code allows the Regional Board to specify requirements to protect underground or surface waters from

leakage from a solid waste site, which includes a method to provide the best assurance of determining the earliest possible detection of a release.

28. In order to provide the best assurance of the earliest possible detection of a release of non-naturally occurring waste constituents from a Unit, this Order specifies a non-statistical method for the evaluation of monitoring data.
29. The specified non-statistical method for evaluation of monitoring data provides two criteria (or triggers) for making the determination that there has been a release of waste constituents from a Unit. The presence of two waste constituents above their respective method detection limit (MDL), or one waste constituent detected above its practical quantitation limit (PQL), indicates that a release of waste from a Unit has occurred. Following an indication of a release, verification testing will be conducted to determine whether there has been a release from the Unit, or there is a source of the detected constituents other than the landfill, or the detection was a false detection. Although the detection of one waste constituent above its MDL is sufficient to provide for the earliest possible detection of a release, the detection of two waste constituents above the MDL as a trigger is appropriate due to the higher risk of false-positive analytical results and the corresponding increase in sampling and analytical expenses from the use of one waste constituent above its MDL as a trigger.

GROUNDWATER DEGRADATION AND CORRECTIVE ACTION

30. Groundwater downgradient from WMU-1 has been impacted with several volatile organic compounds (VOCs) including, but not limited to: 1,2-dichloropropane, 1,1-dichloroethane, trichloroethene, vinyl chloride, and chloroform. The VOC contamination resides primarily in the A and B-zone monitoring wells, except in the vicinity of MW-16C. Monitoring data for the A-zone wells also provide evidence of a release of inorganic constituents from WMU-1.
31. The Discharger is performing corrective action for the VOC groundwater contamination. As part of corrective action, the Discharger is extracting groundwater from four B-zone groundwater extraction wells downgradient from WMU-1. These wells are arranged in a line across the plume to intercept contaminated groundwater. VOCs are removed from the groundwater using air-stripping methods. Treated groundwater is disposed of to the University's wastewater treatment plant. The Discharger has also installed a series of soil vapor extraction wells at WMU-1 to remove VOCs from the source area. The soil vapor was formerly extracted under vacuum and combined with the flows from the landfill gas extraction wells and routed to a gas flare. Soil vapor extraction was discontinued due to reduction of VOC concentrations in the extracted soil vapor to nearly non-detectable levels.
32. On 28 January 2003, Regional Board staff approved the installation of one C-zone extraction well (EW-1C) near MW-16C as part of a response to increasing concentrations

of chloroform in that well. Approval of the location of this well followed an investigation of groundwater in the C-zone delineate the extent of the chloroform impacted groundwater. The investigation indicated that chloroform in the C-zone was generally limited to groundwater near MW-16C. The Discharger has proposed to perform a pump test at EW-1C to determine the number and location of extraction wells to remediate groundwater in the C-zone. The final C-zone remediation system will include the same in-well aeration treatment that is currently being utilized in the B-zone.

LINER PERFORMANCE STANDARD AND ENGINEERED ALTERNATIVE

33. The performance standard for Class III landfills is given in §20310(c) of Title 27, CCR which states: *Class III landfills shall have containment structures which are capable of preventing degradation of waters of the state as a result of waste discharges to the landfills if site characteristics are inadequate.*
34. On 17 June 1993, the State Water Resources Control Board adopted Resolution No. 93-62 implementing a State Policy for the construction, monitoring, and operation of municipal solid waste landfills that is consistent with the federal municipal solid waste regulations promulgated under Title 40, Code of Federal Regulations, Part 258 (Subtitle D).
35. Resolution No. 93-62 requires the construction of a specified single composite liner system at new municipal solid waste landfills, or expansion areas of existing municipal solid waste landfills, that receive wastes after 9 October 1993.
36. Resolution No. 93-62 also allows the Regional Board to consider the approval of engineered alternatives to the prescriptive standard. Section III.A.b. of Resolution No. 93-62 requires that the engineered alternative liner systems be of a composite design similar to the prescriptive standard.
37. Section 20080(b) of Title 27 allows the Regional Board to consider the approval of an engineered alternative to the prescriptive standard. In order to approve an engineered alternative in accordance with §20080(c)(1) and (2), the Discharger must demonstrate that the prescriptive design is unreasonably and unnecessarily burdensome and will cost substantially more than an alternative which will meet the criteria contained in §20080(b), or would be impractical and would not promote attainment of applicable performance standards. The Discharger must also demonstrate that the proposed engineered alternative liner system is consistent with the performance goal addressed by the particular prescriptive standard, and will provide protection against water quality impairment equivalent to the prescriptive standard in accordance with §20080(b)(2) of Title 27.
38. Section 13360(a)(1) of the California Water Code allows the Regional Board to specify the design, type of construction, and/or particular manner in which compliance must be met in waste discharge requirements or orders for the discharge of waste at solid waste disposal

facilities.

39. On 14 April 2000, the Discharger submitted a request for approval of an engineered alternative to the prescriptive standard in Title 27 for the low permeability layer of the WMU-2 liner. The engineered alternative proposed by the Discharger was for the low permeability layer in the bottom liner of WMU-2 to substitute a GCL for the Title 27 prescriptive standard two-feet of compacted clay. The remainder of the proposed liner system was in accordance with the prescriptive standards of Title 27.
40. The Regional Board has routinely approved the substitution of GCLs for the low permeability layer of a landfill liner or cover system. The Discharger was not required to repeat the demonstrations listed in Finding No. 37 because there are no significant differences in the characteristics of already approved GCLs and the low permeability layer substitution proposed for WMU-2. The Regional Board approved the use of GCL as an engineered alternative in WDRs Order No. 5-00-191. This Order continues to provide Regional Board approval of the GCL engineered alternative. However, before the WMU-2 liner system is approved, the Discharger must demonstrate to the Executive Officer that liner system design meets the requirements of Title 27 and these WDRs (see Construction Specification D.2).
41. On 15 September 2000 the Regional Board adopted Resolution No. 5-00-213 *Request For The State Water Resources Control Board To Review The Adequacy Of The Prescriptive Design Requirements For Landfill Waste Containment Systems To Meet The Performance Standards Of Title 27*. The State Board responded, in part, that “a single composite liner system continues to be an adequate minimum standard” however, the Regional Board “should require a more stringent design in a case where it determines that the minimum design will not provide adequate protection to a given body of groundwater.”

In a letter dated 17 April 2001, the Executive Officer notified Owners and Operators of Solid Waste Landfills that “the Board will require a demonstration that any proposed landfill liner system to be constructed after 1 January 2002 will comply with Title 27 performance standards. A thorough evaluation of site-specific factors and cost/benefit analysis of single, double and triple composite liners will likely be necessary.”

42. On 11 February 2003, the Discharger submitted a liner performance demonstration for Cells 7 and 8 of WMU-2. The demonstration provided an assessment of liner system performance for a single composite liner system underlain by a leak detection layer beneath the entire base liner system. The Discharger assessed the performance of the proposed liner system using a GCL as the low permeability layer, and using a compacted clay liner (CCL) as the low permeability layer. The Discharger proposed to have the option of using either a GCL or a CCL depending on the availability of suitable on-site clay.

43. The basic components of the GCL liner system option assessed by the Discharger consists of a leachate collection and removal system (LCRS); 60-mil high density poly-ethylene (HDPE) geomembrane; GCL low permeability layer; 1.5-feet of compacted fine grained soil; leak detection layer; HDPE geomembrane; and fine-grained subgrade. The basic components of the CCL liner system are the same with the GCL being replaced by a 2-foot CCL ($k = 1 \times 10^{-7}$ cm/s or less). In both cases, the leak detection layer would extend beneath the side-slope to at least an elevation of 50 feet above mean sea (MSL) level to provide separation between waste and the highest anticipated level of underlying groundwater. The liner system components approved by this Order are given in more detail in Construction Specifications D.4 and D.5.
44. The Discharger proposes to use tire chips for the LCRS drainage layer and the operations layer. The Discharger reports that tire chips have been used successfully in numerous landfills nationwide and that the California Integrated Waste Management Board (CIWMB) is strongly supporting the use of tire derived materials in order to address environmental issues posed by tire storage facilities. The Discharger has reported that a study by Geosyntc Consultants for the CIWMB reports that tire shreds produced from tires with glass belts and those with steel bead wire removed by debanding prior to shredding will be 100% free of wire and may be placed in direct contact with a geomembrane layer. The Discharger has proposed to place a geotextile cushion between the tire chips and the geomembrane for added protection. Despite these precautions to protect geomembrane layers from puncture, the Regional Board remains concerned that not all of the wire may be removed from the tire chips and that any remaining wire could puncture the liner even with a geotextile cushion. Therefore, this Order requires a layer of gravel to be placed between the geotextile cushion and the tire chips at the UC Davis Landfill.
45. Additional liner performance enhancements proposed by the Discharger include performing an electric leak location survey on the primary HDPE geomembrane layer following liner system installation including the installation of the LCRS drainage layer. This Order requires any installation defects, holes, punctures or tears in the HDPE geomembrane layer found by the survey to be repaired prior to placement of waste.
46. In order to address concerns about landfill gas (LFG) leakage from the liner system, the Discharger has proposed to install an active LFG collection system for WMU-2. The LFG system will be connected to the existing system that supplies LFG to the Primate Center and the flare. This Order requires the Discharger to install and monitor a LFG extraction system at WMU-2, and to extract LFG if detected.
47. An LCRS will be installed above the liner system for WMU-2. The LCRS will drain, collect and remove leachate that percolates to the top of the liner system. Leachate collected from the LCRS of WMU-2 will be disposed at the University's wastewater treatment plant.

48. The Discharger proposes to install pan lysimeters at the lowest point of the leak detection layer beneath the sumps of the WMU-2 liner system for the purposes of liner leak detection and unsaturated zone monitoring.
49. In order to assess the performance of the proposed liner system, the Discharger made some assumptions that were based on liner system leakage data from the 2002 *Assessment and Recommendations for Improving the Performance of Waste Containment Systems*, published by the United States Environmental Protection Agency (USEPA). The report includes evaluations of results of liner performance for over 187 double-lined cells at 54 landfills in the United States. According to the report, landfills with a geomembrane and GCL composite liner had an average hydraulic efficiency of 99.96%. The USEPA report was less definitive about the efficiency of a geomembrane and CCL liner system because a relatively large amount of compression and consolidation water is expelled by the CCL and contributes to flow in the leak detection layer. For comparing multiple liner systems, the Discharger assumed the efficiency of a geomembrane and CCL composite liner was also 99.96%.
50. The Discharger reported that the results of a study on electric leak detection by Nosoko, et al indicated that 25% of leaks found were due to installation defects, 70% were due to mechanical damage caused during placement of overlying soil, and 5% were due to problems that occurred during landfill operations. The Discharger proposes to perform the leak detection survey following placement of the LCRS material. For purposes of estimating liner leakage, the Discharger assumed that repairs to defects identified by the electrical leak survey would reduce the total leakage potential by 75% and that the liner efficiency would increase to 99.99%.
51. The Discharger has estimated that the average leachate generation rate at the landfill is approximately 50 gallons per acre per day (gpad) based on 10,000 gallons that were removed from the Cell 6 LCRS sump during the fourth quarter of 2002. Assuming a liner efficiency of 99.99% for the primary single composite liner system, the Discharger estimates that the average liner leakage rate would be 0.005 gpad. The Discharger reported that Cells 7 and 8 of WMU-2 would have a total area of 3 acres, which would equate to approximately 5.5 gallons of leakage per year. Since the Discharger is also proposing a leak detection layer and secondary geomembrane, leakage from the primary liner system can be detected and removed from the leak detection layer sump. The Discharger has estimated that the total leakage through the entire system including the geomembrane under the leak detection layer would be approximately 0.000011 gpad or 0.012 gallons per year from Cells 7 and 8 during the operational life of the landfill. The Discharger reported that after closure, the leachate generation rates would decrease to an average of 5 gpad during the first 9 years of post-closure maintenance and be essentially zero after 9 years.
52. The Discharger estimated the potential impact to groundwater that might be caused by the estimated overall leakage rate of 0.000011 gpad from Cells 7 and 8. The estimate assumed

that all of the leakage would occur at a single point and produce a plume with a width of 10 feet. Using the known groundwater gradient, underlying soil porosity and horizontal permeability, the Discharger calculated the potential increase in concentrations of constituents of concern (COCs) at the downgradient edge of the landfill. The Discharger conservatively assumed concentrations of COCs in leachate of the highest concentration in they found in the literature for volatile organic compounds (VOCs), and the average concentration for dissolved metals. The Discharger also conservatively assumed that no attenuation of chemical constituents would occur in the soil beneath the landfill. Results of this analysis are given in Table 2 of Appendix D of the Discharger's liner performance demonstration report. The results indicate a negligible increase in all COCs several orders of magnitude below the applicable water quality objectives for these constituents.

53. The Discharger also performed a cost/benefit analysis of single, double and triple composite liner systems. Based on the results of this analysis, the Discharger concluded that while the cost of more stringent liner systems increases significantly, the leakage potential remains essentially zero.
54. Although the Discharger's liner performance demonstration indicates that leakage potential through the proposed liner system is very small, this Order requires the additional protection of adding a GCL layer beneath the leak detection layer geomembrane at the sump. This requirement is based on the possibility of a leak in the geomembrane layer beneath the leak detection layer that would allow leachate to leak out of the sump before it could be detected by periodic monitoring of the leak detection layer sump. The entire leak detection layer will also be underlain by fine grained soils that may provide additional protection.
55. Based on the information presented in the liner performance demonstration report submitted by the Discharger, the Regional Board finds that the single composite liner system with underlying leak detection layer that is required by this Order meets the Title 27 Class III performance standard at the UC Davis Class III Landfill.
56. An unsaturated zone monitoring system does not exist for WMU-1. WMU-1 is an unlined unit that has already leaked and impacted the underlying unsaturated zone and groundwater. Since the purpose of an unsaturated zone monitoring system is to detect a leak from a landfill unit, it is not practical to monitor the unsaturated zone beneath WMU-1 since the unsaturated zone has already been impacted. This Order waives the unsaturated zone monitoring requirement for WMU-1 (see Detection Monitoring Specification G.3).
57. Construction of new cells for WMU-2 will proceed only after all applicable construction quality assurance plans have been approved by Executive Officer.

CEQA AND OTHER CONSIDERATIONS

58. The action to revise waste discharge requirements for this landfill is exempt from the

provisions of the California Environmental Quality Act (CEQA), Public Resource Code §21000, et seq., and the CEQA guidelines, in accordance with Title 14, CCR, §15301.

59. An Environmental Impact Report was prepared by the Discharger for the WMU 2 expansion in April of 1995 under State Clearinghouse #93081104. The Regional Board considered this document in the preparation of WDRs.
60. This Order implements:
 - a) The *Waste Quality Control Plan for the Sacramento River and San Joaquin River Basins, Fourth Edition*;
 - b) The prescriptive standards and performance goals of Chapters 1 through 7, Subdivision 1, Division 2, Title 27, of the California Code of Regulations, effective 18 July 1997, and subsequent revisions;
 - c) The prescriptive standards and performance criteria of RCRA Subtitle D, Part 258; and
 - d) State Water Resources Control Board Resolution No. 93-62, *Policy for Regulation of Discharges of Municipal Solid Waste*, adopted 17 June 1993.
61. These requirements implement the prescriptive standard and performance goals of Title 27, California Code of Regulations, §20005 et seq. (Title 27).
62. Section 13267(b) of California Water Code provides that: "In conducting an investigation specified in subdivision (a), the Regional Board may require that any person who has discharged, discharges, or is suspected of discharging, or who proposed to discharge within its region, or any citizen or domiciliary, or political agency or entity of this state who had discharged, discharges, or is suspected of discharging, or who proposed to discharge waste outside of its region that could affect the quality of the waters of the state within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the board requires. The burden, including costs of these reports, shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. The monitoring and reporting program required by this Order and the attached "Monitoring and Reporting Program No. R5-2003-0077" are necessary to assure compliance with these waste discharge requirements. The Discharger operates the facility that discharges the waste subject to this Order.

PROCEDURAL REQUIREMENTS

63. All local agencies with jurisdiction to regulate land use, solid waste disposal, air pollution, and to protect public health have approved the use of this site for the discharges of waste to land stated herein.
64. The Regional Board notified the Discharger and interested agencies and persons of its

intent to prescribe waste discharge requirements for this discharge, and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

65. The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge.
66. Any person affected by this action of the Regional Board may petition the State Water Resources Control Board to review the action in accordance with Sections 2050 through 2068, Title 23, California Code of Regulations. The petition must be received by the State Water Resources Control Board, Office of Chief Counsel, P.O. Box 100, Sacramento, California 95812, within 30 days of the date of issuance of this Order. Copies of the laws and regulations applicable to the filing of a petition are available on the Internet at http://www.swrcb.ca.gov/water_laws/index.html and will be provided on request.

IT IS HEREBY ORDERED, pursuant to Sections 13263 and 13267 of the California Water Code, that Order No. 5-00-191 is rescinded, and that the University of California and the University of California, Davis, its agents, successors, and assigns, in order to meet the provisions of Division 7 of the California Water Code and the regulations adopted thereunder, shall comply with the following:

A. PROHIBITIONS

1. The discharge of 'hazardous waste' or 'designated waste' is prohibited. For the purposes of this Order, the term 'hazardous waste' is as defined in Title 23, California Code of Regulations, Section 2510 et seq., and 'designated waste' is as defined in Title 27.
2. The discharge of wastes outside of a Unit or portions of a Unit specifically designed for their containment is prohibited.
3. The discharge of waste to a closed Unit is prohibited.
4. The discharge of liquid or semi-solid waste (i.e., waste containing less than 50 percent solids) to the landfill is prohibited.
5. The discharge of solid waste containing free liquid or moisture in excess of the waste's moisture holding capacity is prohibited.
6. The discharge of solid or liquid waste or leachate to surface waters, surface water drainage courses, or groundwater is prohibited.
7. The discharge of waste to ponded water from any source is prohibited.

8. The discharge of waste within 100 feet of surface waters is prohibited.
9. The discharge shall not cause the release of pollutants, or waste constituents in a manner which could cause a condition of nuisance, degradation, contamination, or pollution of groundwater to occur, as indicated by the most appropriate statistical or nonstatistical data analysis method and retest method listed in this Order, the Monitoring and Reporting Program, or the Standard Provisions and Reporting Requirements.
10. The discharge shall not cause any increase in the concentration of waste constituents in soil-pore gas, soil-pore liquid, soil, or other geologic materials outside of the Unit if such waste constituents could migrate to waters of the State — in either the liquid or the gaseous phase — and cause a condition of nuisance, degradation, contamination, or pollution.

B. DISCHARGE SPECIFICATIONS

1. Wastes shall only be discharged into, and shall be confined to, the waste management units specifically designed for their containment, as described in Findings or this Order, and as shown on Attachment B.
2. The handling and disposal of friable asbestos-containing wastes at this facility shall be in accordance with all applicable federal and state statutes and regulations.
3. The discharge shall remain within the designated disposal area at all times.
4. Prior to the discharge of waste to a waste management unit, all wells within 500 feet of the unit shall have sanitary seals that meet the requirements of the Yolo County Health Department or shall be properly abandoned. A record of the sealing and/or abandonment of such wells shall be sent to the Regional Board and to the State Department of Water Resources.

C. FACILITY SPECIFICATIONS

1. The Discharger shall, in a timely manner, remove and relocate any wastes discharged at this facility in violation of this Order.
2. The Discharger shall immediately notify the Regional Board of any flooding, unpermitted discharge of waste off-site, equipment failure, slope failure, or other change in site conditions which could impair the integrity of waste or leachate containment facilities or precipitation and drainage control structures.

3. Water used for facility maintenance shall be limited to the minimum amount necessary for dust control, and construction.
4. The Discharger shall maintain in good working order any facility, control system, or monitoring device installed to achieve compliance with the waste discharge requirements.
5. A minimum separation of 10 feet shall be maintained between WMU-1 wastes or leachate and the highest anticipated elevation of underlying groundwater including the capillary fringe. For WMU-2, either a minimum of 5 feet shall be maintained between wastes, including leachate, and the highest anticipated elevation of underlying groundwater including the capillary fringe, **or** an additional engineered barrier layer shall be constructed to prevent groundwater from coming to within 1 foot of the bottom of the liner system (1.5 feet if GCL is used).
6. At WMU-1 and WMU-2, methane and other landfill gases shall be adequately vented, removed from the Units, or otherwise controlled to prevent the danger of adverse health effects, nuisance conditions, or the impairment of the beneficial uses of surface water or groundwater due to migration through the unsaturated zone. The Discharger shall install a landfill gas extraction system at WMU-2. The Discharger shall monitor WMU-2 for the presence of methane or other landfill gas and landfill gases shall be extracted from the system if detected.
7. Surface drainage within the waste management facility shall either be contained on-site or be discharged in accordance with applicable storm water regulations.
8. The Discharger shall maintain a *Storm Water Pollution Prevention Plan* and *Monitoring Program and Reporting Requirements* in accordance with State Water Resources Control Board Order No. 97-03-DWG, or retain all storm water on-site.

D. CONSTRUCTION SPECIFICATIONS

1. The design and construction of landfill waste containment structures shall be under the direct supervision of a California registered civil engineer or certified engineering geologist.
2. The Discharger shall submit for Executive Officer review and approval **prior to** construction, design plans and specifications for new Units and expansions of existing Units, that include the following:
 - a. A Construction Quality Assurance Plan meeting the requirements of §20324 of Title 27; and

- b. A geotechnical evaluation of the area soils, evaluating their use as the base layer; and
 - c. An unsaturated zone monitoring system, which is demonstrated to remain effective throughout the active life, closure, and post-closure maintenance periods of the Unit, which shall be installed beneath the composite liner system in accordance with §20415(d) of Title 27.
- 3. The Discharger shall provide engineered structures to ensure separation between groundwater and waste for WMU-2. These engineered structures shall consist of a barrier layer that is placed a minimum of 1 foot below the bottom of the liner system. The required HDPE layer below the leak detection layer can also be used as the required barrier layer.
- 4. The **base liner system** for all new cells of WMU-2 shall be constructed in accordance with one of the following composite liner designs:
 - a. The prescriptive standard design that consists of a lower compacted soil layer that is a minimum of two feet thick with a hydraulic conductivity of 1×10^{-7} cm/sec or less and has a minimum relative compaction of at least 90%. Immediately above the compacted soil layer, and in direct and uniform contact with the soil layer, shall be a synthetic flexible membrane component, which is immediately overlain with an LCRS. An operations layer shall be placed above the leachate collection and removal system. The entire base liner system shall be underlain by a leak detection layer and a moisture barrier that shall be extended up the side slope to a minimum elevation of 50 feet MSL. Components of the base liner system and leak detection layer shall be (from top to bottom):
 - 1. A minimum 1-foot operations layer of soil or chipped tires;
 - 2. A minimum 1-foot drainage layer of gravel or chipped tires underlain by gravel;
 - 3. A geotextile cushion layer;
 - 4. A minimum 60-mil HDPE geomembrane layer;
 - 5. A minimum of 2-feet of compacted clay ($k = 1 \times 10^{-7}$ cm/s or less);
 - 6. A minimum 1-foot earthfill layer;
 - 7. A geocomposite or sand leak detection layer;
 - 8. A minimum 40-mil HDPE geomembrane layer;
 - 9. Fine grained smooth rolled subgrade soil;
 - ; *or*
 - b. An engineered alternative composite liner system that consists of a geosynthetic clay liner (GCL) that is at least 7 millimeters (mm) thick (after

hydration) and that has a maximum permeability of 5×10^{-9} cm/sec. Immediately above the GCL layer, and in direct and uniform contact with the GCL layer, shall be a synthetic flexible membrane component, which is immediately overlain with an LCRS. An operations layer shall be placed above the leachate collection and removal system. The entire base liner system shall be underlain by a leak detection layer and a moisture barrier that shall be extended up the side slope to a minimum elevation of 50 feet MSL. Components of the base liner system and leak detection layer shall be (from top to bottom):

1. A minimum 1-foot operations layer of soil or chipped tires;
2. A minimum 1-foot drainage layer of gravel or chipped tires underlain by gravel;
3. A geotextile cushion layer;
4. A minimum 60-mil HDPE geomembrane layer;
5. A minimum 7 mm thick geosynthetic clay liner;
6. A minimum of 1.5 feet of compacted fine-grained earthfill;
7. A geocomposite or sand leak detection layer;
8. A minimum 40-mil HDPE geomembrane layer;
9. Fine grained smooth rolled subgrade soil;

5. The **side-slope liner system** for all new cells of WMU-2 shall be constructed in accordance with one of the following composite liner designs:

- a. The prescriptive standard design that consists of a lower compacted soil layer that is a minimum of two feet thick with a hydraulic conductivity of 1×10^{-7} cm/sec or less and has a minimum relative compaction of at least 90%. Immediately above the compacted soil layer, and in direct and uniform contact with the soil layer, shall be a synthetic flexible membrane component, which is immediately overlain with an LCRS. An operations layer shall be placed above the leachate collection and removal system. Components of the side-slope liner system shall be (from top to bottom):

1. A minimum 1-foot soil operations layer;
2. A geocomposite drainage layer;
3. A minimum 60-mil HDPE geomembrane layer;
4. A minimum of 2-feet of compacted clay ($k = 1 \times 10^{-7}$ cm/s or less);

; **or**

- b. An engineered alternative composite liner system that consists of a geosynthetic clay liner (GCL) that is at least 7 millimeters (mm) thick (after hydration) and that has a maximum permeability of 5×10^{-9} cm/sec.

Immediately above the GCL layer, and in direct and uniform contact with the GCL layer, shall be a synthetic flexible membrane component, which is immediately overlain with an LCRS. An operations layer shall be placed above the leachate collection and removal system. Components of the side-slope liner system and leak detection layer shall be (from top to bottom):

1. A minimum 1-foot soil operations layer;
 2. A geocomposite drainage layer;
 3. A minimum 60-mil HDPE geomembrane layer;
 4. A minimum 7 mm thick geosynthetic clay liner;
 5. A minimum of 1.5 feet of compacted fined-grained earthfill.
6. As part of Construction Quality Assurance, the Discharger shall perform a leak detection survey over the entire liner system. The survey shall be performed after placement of the operations layer on the side-slope areas, and after placement of the drainage layer on the base. Any holes, tears, or defects discovered by the survey shall be documented and repaired prior to placement of waste.
 7. A GCL layer shall underlie the HDPE geomembrane layer of the leak detection layer at the leak detection layer sump.
 8. The Discharger may propose changes to the liner system design prior to construction, provided that approved components are not eliminated, the engineering properties of the components are not substantially reduced, and the proposed liner system results in the protection of water quality equal to or greater than the design prescribed by Title 27 and this Order. The proposed changes may be made following approval by the Executive Officer. Substantive changes to the design require reevaluation as an engineered alternative and approval by the Regional Board.
 9. If the Discharger proposes to construct a liner system in which a GCL is placed on top of a subgrade, the subgrade for the bottom and the side slopes of the Unit shall be prepared in an appropriate manner using accepted engineering and construction methods so as to provide a smooth surface that is free from rocks, sticks, or other debris that could damage or otherwise limit the performance of the GCL.
 10. Construction shall proceed only after all applicable construction quality assurance plans have been approved by Executive Officer.
 11. Following the completion of construction of a Unit or portion of a Unit, and prior to discharge onto the newly constructed liner system, the final documentation required in §20324(d)(1)(C) of Title 27 shall be submitted to the Executive Officer for review and approval. The report shall be certified by a registered civil engineer or a certified engineering geologist. It shall contain sufficient information and test results to verify

- that construction was in accordance with the design plans and specifications, and with the prescriptive standards and performance goals of Title 27.
12. A third party independent of both the Discharger and the construction contractor shall perform all of the construction quality assurance monitoring and testing during the construction of a liner system.
 13. LCRSs shall be designed, constructed, and maintained to collect twice the anticipated daily volume of leachate generated by the WMU and to prevent the buildup of hydraulic head on the underlying liner at any time.
 14. Leachate generation by a landfill unit LCRS shall not exceed 85% of the design capacity of the sump pump. If leachate generation exceeds this value or if the depth of fluid in an LCRS exceeds the minimum needed for pump operations then the Discharger shall immediately cease the discharge of sludge and other high-moisture wastes to the landfill unit and shall notify the Regional Board in writing within seven days. Notification shall include a time table for corrective action necessary to reduce leachate production.
 15. New landfill units and lateral expansions shall not be located in wetlands unless the Discharger has successfully completed, and the Regional Board has approved, all demonstrations required for such discharge under 40 CFR 258.12(a).
 16. If located in a 100-year floodplain, landfill units shall not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste so as to pose a hazard to human health and the environment. Units which cannot comply with this requirement shall close by 9 October 1996, unless otherwise extended by the Regional Board. (40 CFR 258.16)

E. CLOSURE SPECIFICATIONS

1. The closure of the landfill shall be under the direct supervision of a California registered civil engineer or certified engineering geologist.
2. The Discharger shall submit a Final Closure and Post-Closure Maintenance Plan as well as closure design plans and specifications for Executive Officer review and approval at least 180 days **prior to** closure construction.
3. At closure, WMU-2 shall receive a composite final cover that is not to be more permeable than the Units composite liner, and that is designed and constructed in accordance with the prescriptive standard requirements of Title 27, or an engineered equivalent final cover approved by the Regional Board in revised WDRs pursuant to §20080(b) and (c) of Title 27.

4. Closed landfill units shall be provided with at least two permanent monuments, installed by a licensed land surveyor, from which the location and elevation of all wastes, containment structures, and monitoring facilities can be determined throughout the post-closure maintenance period.
5. Vegetation shall be planted and maintained over each closed landfill unit. Vegetation shall be selected to require a minimum of irrigation and maintenance and shall have a rooting depth not in excess of the vegetative layer thickness.
6. Closed landfill units shall be graded to at least 3% grade and maintained to prevent ponding.

F. POST-CLOSURE MAINTENANCE SPECIFICATIONS

1. During the closure and post-closure maintenance period, the Discharger shall conduct routine maintenance of the final cover, areas with interim cover, the precipitation and drainage control facilities, the groundwater, any unsaturated zone and landfill gas monitoring systems, any landfill gas extraction system, and any facilities associated with corrective action.
2. The Discharger shall, in a timely manner, repair any areas of the final cover that have been damaged by erosion, cracking, differential settlement, subsidence or any other causes that could allow ponding of surface water or percolation of surface water into the wastes.
3. Prior to the rainy season, the Discharger shall perform any and all necessary reseeded of interim and final covers to maintain adequate vegetation to prevent erosion.
4. The Discharger shall perform all post-closure maintenance activities specified in the facility's Final Closure and Post-Closure Maintenance Plan that are not specifically referred to in this Order.

G. DETECTION MONITORING SPECIFICATIONS

1. The Discharger shall submit for Executive Officer review and approval a groundwater detection monitoring program demonstrating compliance with Title 27 for any Unit expansion.
2. The Discharger shall comply with the detection monitoring program provisions of Title 27 for groundwater, surface water, and the unsaturated zone, and in accordance with Monitoring and Reporting Program No. R5-2003-0077. A detection monitoring program for a new Unit, or an expansion of an existing Unit, shall be installed,

- operational, and the one year of background monitoring data shall be collected **prior to** the discharge of wastes, as required by §20415(e)(6) of Title 27. The first round of samples shall be collected from the detection monitoring well(s) **prior to** the discharge of wastes.
3. The requirement for unsaturated zone monitoring for WMU-1 is waived as described in Finding No. 45.
 4. The Discharger shall provide Regional Board staff a minimum of **one week** notification prior to commencing any field activities related to the installation, repair, or abandonment of monitoring devices or the collection of samples associated with a detection monitoring program, evaluation monitoring program, or corrective action program.
 5. The Discharger shall comply with the Water Quality Protection Standard (as defined in §20390 of Title 27) which is specified in Monitoring and Reporting Program No. R5-2003-0077 and the Standard Provisions and Reporting Requirements, dated April 2000.
 6. The Water Quality Protection Standard for organic compounds which are not naturally occurring and not detected in background groundwater samples shall be taken as the detection limit of the analytical method used (i.e., US-EPA methods 8260 and 8270). The presence of non-naturally occurring organic compounds in samples from detection monitoring wells is evidence of a release from the Unit.
 7. The concentrations of the constituents of concern in waters passing the Point of Compliance shall not exceed the concentration limits established pursuant to Monitoring and Reporting Program No. R5-2003-0077.
 8. For each monitoring event, the Discharger shall determine whether the landfill is in compliance with the Water Quality Protection Standard using procedures specified in Monitoring and Reporting Program No. R5-2003-0077 and §20415(e) of Title 27.
 9. For any given monitored medium, the samples taken from all Monitoring Points and Background Monitoring Points to satisfy the data analysis requirements for a given Reporting Period shall all be taken **within a span not to exceed 30 days**, unless the Executive Officer approves a longer time period, and shall be taken in a manner that ensures sample independence to the greatest extent feasible.
 10. Specific methods of collection and analysis must be identified. Sample collection, storage, and analysis shall be performed according to the most recent version of USEPA Methods, such as the latest editions, as applicable, of: (1) "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater" (USEPA 600 Series), (2) "Test Methods for Evaluating Solid Waste" (SW 846-latest edition), and

- (3) “Methods for Chemical Analysis of Water and Wastes (USEPA 600/4-79-020),” and in accordance with an approved Sample Collection and Analysis Plan.
11. If methods other than USEPA-approved methods or Standard Methods are used, the exact methodology shall be submitted for review and approval by the Executive Officer prior to use. The Discharger may propose an alternate statistical method [to the methods listed under 27 CCR §20415(e)(8)(A-D)] in accordance with §20415(e)(8)(E) of Title 27, for review and approval by the Executive Officer.
 12. The **methods of analysis and the detection limits** used must be appropriate for the expected concentrations. For the monitoring of any constituent or parameter that is found in concentrations which produce more than 90% non-numerical determinations (i.e., “trace” or “ND”) in data from Background Monitoring Points for that medium, the analytical method having the lowest method detection limit (MDL) shall be selected from among those methods which would provide valid results in light of any matrix effects or interferences.
 13. **“Trace” results** - results falling between the MDL and the practical quantitation limit (PQL) - shall be reported as such, and shall be accompanied both by the estimated MDL and PQL values for that analytical run.
 14. **MDLs and PQLs** shall be derived by the laboratory for each analytical procedure, according to State of California laboratory accreditation procedures. These MDLs and PQLs shall reflect the detection and quantitation capabilities of the specific analytical procedure and equipment used by the lab, rather than simply being quoted from USEPA analytical method manuals. In relatively interference-free water, laboratory-derived MDLs and PQLs are expected to closely agree with published USEPA MDLs and PQLs.
 15. If the laboratory suspects that, due to a change in matrix or other effects, the true detection limit or quantitation limit for a particular analytical run differs significantly from the laboratory-derived MDL/PQL values, the results shall be flagged accordingly, along with estimates of the detection limit and quantitation limit actually achieved. The **MDL shall always be calculated such that it represents the lowest achievable concentration associated with a 99% reliability of a nonzero result.** The PQL shall always be calculated such that it represents the lowest constituent concentration at which a numerical value can be assigned with reasonable certainty that it represents the constituent’s actual concentration in the sample. Normally, PQLs should be set equal to the concentration of the lowest standard used to calibrate the analytical procedure.
 16. All **QA/QC data** shall be reported, along with the sample results to which they apply, including the method, equipment, and analytical detection and quantitation limits, the

- percent recovery, an explanation for any recovery that falls outside the QC limits, the results of equipment and method blanks, the results of spiked and surrogate samples, the frequency of quality control analysis, and the name and qualifications of the person(s) performing the analyses. Sample results shall be reported unadjusted for blank results or spike recoveries. In cases where contaminants are detected in QA/QC samples (i.e., field, trip, or lab blanks), the accompanying sample results shall be appropriately flagged.
17. **Unknown chromatographic** peaks shall be reported, along with an estimate of the concentration of the unknown analyte. When unknown peaks are encountered, second column or second method confirmation procedures shall be performed to attempt to identify and more accurately quantify the unknown analyte.
 18. The statistical method shall account for data below the practical quantitation limit (PQL) with one or more statistical procedures that are protective of human health and the environment. Any PQL validated pursuant to §20415(e)(7) of Title 27 that is used in the statistical method shall be **the lowest concentration (or value) that can be reliably achieved** within limits of precision and accuracy specified in the WDRs for routine laboratory operating conditions that are available to the facility. The Discharger's technical report, pursuant to §20415(e)(7) of Title 27 shall consider the PQLs listed in Appendix IX to Chapter 14 of Division 4.5 of Title 22, California Code of Regulations, for guidance when specifying limits of precision and accuracy. For any given constituent monitored at a background or downgradient monitoring point, an indication that falls between the method detection limit (MDL) and the PQL for that constituent (hereinafter called a "trace" detection) shall be identified and used in appropriate statistical or nonstatistical tests. Nevertheless, for a statistical method that is compatible with the proportion of censored data (trace and ND indications) in the data set, the Discharger can use the laboratory's concentration estimates in the trace range (if available) for statistical analysis, in order to increase the statistical power by decreasing the number of "ties".
 19. Upon receiving written approval from the Executive Officer, alternate statistical procedures may be used for determining the significance of analytical results for common laboratory contaminants (i.e., methylene chloride, acetone, diethylhexyl phthalate, and di-n-octyl phthalate). Nevertheless, analytical results involving detection of these analytes in any background or downgradient sample shall be reported and flagged for easy reference by Regional Board staff.
 20. The Discharger shall use the following nonstatistical method for the VOC_{water} and VOC_{spg} (Soil Pore Gas) Monitoring Parameters and for all Constituents of Concern which are not amenable to the statistical tests above (i.e., less than 10% of the data from background samples equal or exceed their respective MDL). Each qualifying constituent at a Monitoring Point shall be determined based on either:

- a. The data from a single sample for that constituent, taken during that Reporting Period from that Monitoring Point; or
- b. The data from the sample which contains the largest number of qualifying constituents, where several independent samples have been analyzed for that constituent at a given Monitoring Point.

Background for water samples or soil-pore gas samples shall be represented by the data from all samples taken from applicable Background Monitoring Points during that Reporting Period (at least one sample from each Background Monitoring Point).

21. The method shall be implemented as follows:

- a. *For the Volatile Organic Compounds Monitoring Parameter For Water Samples [VOC_{water}]*: For any given Monitoring Point, the VOC_{water} Monitoring Parameter is a composite parameter addressing all “qualifying VOCs” (in this case, VOCs that are detected in less than 10% of background samples).

The Discharger shall conduct verification testing (see Detection Monitoring Specifications E.21. and E.23 below, as appropriate) to determine whether a release of VOC_{water} Monitoring Parameter has occurred if the data for any Monitoring Point meets either of the following triggering conditions:

1. the data contains two or more qualifying VOCs that equal or exceed their respective MDLs; or
2. the data contains one qualifying VOC that equals or exceeds its PQL.

- b. *For the Volatile Organic Compounds Monitoring Parameter For Soil Pore Gas Samples [VOC_{spg}]*: the VOC_{spg} Monitoring Parameter is a composite parameter for soil pore gas addressing all “qualifying VOCs” detectable using either GC or GC/MS analysis for at least a ten liter sample of soil pore gas (e.g., collected in a vacuum canister). It involves the same scope of VOCs as does the VOC_{water} Monitoring Parameter. For the VOC_{spg} test, “qualifying VOCs” consist of all those VOCs which are detectable in less than 10% of background soil pore gas samples.

The Discharger shall conduct verification testing (see Detection Monitoring Specifications E.21. and E.23 below, as appropriate) to determine whether a release of VOC_{spg} Monitoring Parameter has occurred if the data for any Monitoring Point meets either of the following triggering conditions:

1. the data contains two or more qualifying VOCs that equal or exceed their respective MDLs; or
 2. the data contains one qualifying VOC that equals or exceeds its PQL.
- c. *For Constituents of Concern:* For five-yearly testing of all Constituents of Concern (COCs), the “qualifying constituents” consist of COCs that are detected in less than 10% of applicable background samples.

The Discharger shall conduct verification testing (see Detection Monitoring Specifications E.22. and E.23 below, as appropriate) to determine whether a release of COCs has occurred if the data for any Monitoring Point meets either of the following triggering conditions:

1. the data contains two or more qualifying constituents that equal or exceed their respective MDLs; or
2. the data contains one qualifying constituent that equals or exceeds its PQL.

22. **Non-Statistical Method Retest.** A non-statistical test method may be used by the Discharger to analyze the monitoring data for which it is impractical to conduct a statistical analysis. A non-statistical test method shall include a procedure to verify that there is “measurably significant” evidence of a release from the Unit. For the VOC_{water}, VOC_{spg}, and nonstatistical COC test, the Discharger shall use a discrete retest consisting of two new samples from each indicating monitoring point. The Discharger shall conduct the retest for the standard nonstatistical method as follows:

- a. **For VOC_{water} and VOC_{spg}.** Because the VOC composite Monitoring Parameter (for water or soil pore gas) is a single parameter which addresses an entire family of constituents likely to be present in any landfill release, **the scope of the laboratory analysis for each of the two retest samples shall include all VOCs detectable in that retest sample.** Therefore, a confirming retest, in accordance with Section Q.3. or Q.4., above, for either triggering condition in either of the two retest samples, shall have validated the original indication even if the detected constituents in the confirming retest sample(s) differs from those detected in the sample which initiated the retest.
- b. **For Constituents of Concern.** Because all Constituents of Concern that are jointly addressed in the non-statistical test above, remain as individual Constituents of Concern, **the scope of the laboratory analysis for the non-statistical retest of Constituents of Concern shall address only those constituents detected in the sample which initiated the retest.** Therefore, the

list of “qualifying constituents” for use in the retest, under Section Q.5., shall consist of those constituents which provided the original indication at that Monitoring Point. If the retest meets either triggering condition in either of the two retest samples, the retest shall have validated the original indication.

23. **Response to Detection in Background of VOCs** (or any other constituent which is not naturally in the background and thus is not amenable to statistical analysis):

- a. Any time the laboratory analysis of a sample from a Background Monitoring Point, sampled for VOCs, shows either:
 1. two or more VOCs at or above their respective MDL; or
 2. one VOC at or above its respective PQL.

Then the Discharger shall:

- a. **immediately** notify the Regional Board by phone;
 - b. follow up with written notification by certified mail **within seven days**;
 - c. obtain **two** new independent VOC samples from that Background Monitoring Point; and
 - d. send such samples for laboratory analysis of all detectable VOCs **within thirty days**.
- b. If either or both the new samples validates the presence of VOC(s), using the above criteria, the Discharger shall:
 1. **immediately** notify the Regional Board about the VOC(s) verified to be present at that Background Monitoring Point, and follow up with written notification submitted by certified mail **within seven days** of validation; and
 2. if the Discharger believes that the VOC(s) in background is from a source other than the Unit, then:
 - a. **within seven days** of determining “measurably significant” evidence of a release, submit to the Regional Board by certified mail a

Notification of Intent to make such a demonstration pursuant to §20420(k)(7) of Title 27; and

- b. **within 90 days** of determining “measurably significant” evidence of a release, submit a report to the Regional Board that demonstrates that a source other than the Unit caused the evidence, or that the evidence resulted from error in sampling, analysis, or evaluation, or from natural variation in groundwater, surface water, or the unsaturated zone.
 - c. If the Executive Officer determines, after reviewing the submitted report(s), that the VOC(s) detected originated from a source other than the Unit(s), the Executive Officer will make appropriate changes to the monitoring program.
24. If the Executive Officer determines, after reviewing the submitted report, that the detected VOC(s) most likely originated from the Unit(s), the Discharger shall **immediately** implement the requirements of XI. Response To A Release, C. Release Has Been Verified, contained in the Standard Provisions and Reporting Requirements.

H. REPORTING REQUIREMENTS

1. In the event the Discharger does not comply or will be unable to comply with any prohibition or limitation of this Order for any reason, the Discharger shall notify the appropriate Regional Board office by telephone **as soon as** it or its agents have knowledge of such noncompliance or potential for noncompliance, and shall confirm this notification in writing **within two weeks**. The written notification shall state the nature, time and cause of noncompliance, and shall describe the measures being taken to prevent recurrences and shall include a timetable for corrective actions.
2. The Discharger shall retain records of all monitoring information, including all calibration and maintenance records, all original strip chart recordings of continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Executive Officer.

Such legible records shall show the following for each sample:

- a. Sample identification and the Monitoring Point or Background Monitoring Point from which it was taken, along with the identity of the individual who obtained the sample;
 - b. Date, time, and manner of sampling;
 - c. Date and time that analyses were started and completed, and the name of the personnel and laboratory performing each analysis;
 - d. Complete procedure used, including method of preserving the sample, and the identity and volumes of reagents used;
 - e. Calculation of results; and
 - f. Results of analyses, and the MDL and PQL for each analysis.
3. A transmittal letter explaining the essential points shall accompany each report. At a minimum, the transmittal letter shall identify any violations found since the last report was submitted, and if the violations were corrected. If no violations have occurred since the last submittal, this shall be stated in the transmittal letter. The transmittal letter shall also state that a discussion of any violations found since the last report was submitted, and a description of the actions taken or planned for correcting those violations, including any references to previously submitted time schedules, is contained in the accompanying report.
4. Each monitoring report shall include a compliance evaluation summary. The summary shall contain at least:
 - a. For each Monitoring Point and Background Monitoring Point addressed by the report, a description of:
 1. the time of water level measurement;
 2. the type of pump - or other device - used for purging and the elevation of the pump intake relative to the elevation of the screened interval;
 3. the method of purging (the pumping rate, the equipment and methods used to monitor field pH, temperature, and conductivity during purging, the calibration of the field equipment, results of the pH, temperature, conductivity, and turbidity testing, and the method of disposing of the purge water) to remove all portions of the water that was in the well bore while the sample was being taken;

4. the type of pump - or other device - used for sampling, if different than the pump or device used for purging; and
 5. a statement that the sampling procedure was conducted in accordance with the Sampling and Analysis Plan approved by the Executive Officer.
- b. A map or aerial photograph showing the locations of observation stations, Monitoring Points, and Background Monitoring Points.
 - c. For each groundwater body, a description and graphical presentation of the gradient and direction of groundwater flow under/around the Unit, based upon water level elevations taken prior to the collection of the water quality data submitted in the report. An estimate of the groundwater flow rate shall also be calculated and reported.
 - d. Laboratory statements of results of all analyses evaluating compliance with requirements.
 - e. An evaluation of the effectiveness of the leachate monitoring and control facilities, and of the run-off/run-on control facilities.
 - f. A summary and certification of completion of all **Standard Observations** for the Unit(s), for the perimeter of the Unit, and for the receiving waters. The Standard Observations shall include:
 1. For the Unit:
 - a. Evidence of ponded water at any point on the facility (show affected area on map);
 - b. Evidence of odors: presence or absence, characterization, source, and distance of travel from source; and
 - c. Evidence of erosion and/or of day-lighted refuse.
 2. Along the perimeter of the Unit:
 - a. Evidence of liquid leaving or entering the Unit, estimated size of affected area, and flow rate (show affected area on map);
 - b. Evidence of odors: presence or absence, characterization, source, and distance of travel from source; and

- c. Evidence of erosion and/or of day-lighted refuse.
- 3. For receiving waters:
 - a. Floating and suspended materials of waste origin: presence or absence, source, and size of affected area;
 - b. Discoloration and turbidity: description of color, source, and size of affected area;
 - c. Evidence of odors: presence or absence, characterization, source, and distance of travel from source;
 - d. Evidence of water uses: presence of water-associated wildlife;
 - e. Flow rate; and
 - f. Weather conditions: wind direction and estimated velocity, total precipitation during recent days and on the day of observation.
- g. The quantity and types of wastes discharged and the locations in the Unit where waste has been placed since submittal of the last such report.
- 5. The Discharger shall report by telephone any seepage from the disposal area **immediately** after it is discovered. A written report shall be filed with the Regional Board **within seven days**, containing at least the following information:
 - a. A map showing the location(s) of seepage;
 - b. An estimate of the flow rate;
 - c. A description of the nature of the discharge (e.g., all pertinent observations and analyses);
 - d. Verification that samples have been submitted for analyses of the Constituents of Concern and Monitoring Parameters, and an estimated date that the results will be submitted to the Regional Board; and
 - e. Corrective measures underway or proposed, and corresponding time schedule.
- 6. The Discharger shall submit an **Annual Monitoring Summary Report** to the Regional Board covering the reporting period of the previous monitoring year. This report shall contain:

- a. All monitoring parameters and constituents of concern shall be graphed so as to show historical trends at each Monitoring Point and Background Monitoring Point, for all samples taken within at least the previous five calendar years. Each such graph shall plot the concentration of one or more constituents for the period of record for a given Monitoring Point or Background Monitoring Point, at a scale appropriate to show trends or variations in water quality. The graphs shall plot each datum, rather than plotting mean values. For any given constituent or parameter, the scale for background plots shall be the same as that used to plot downgradient data. Graphical analysis of monitoring data may be used to provide significant evidence of a release.
- b. Unless otherwise exempted by the Executive Officer, all monitoring analytical data obtained during the previous two six-month Reporting Periods, shall be presented in tabular form as well as on 3.50" computer diskettes, either in MS-DOS/ASCII format or in another file format acceptable to the Executive Officer. Data sets too large to fit on a single diskette may be submitted on disk in a commonly available compressed format (e.g. PKZIP). The Regional Board regards the submittal of data in hard copy and in digital format as "...the form necessary for..." statistical analysis [§20420(h)], in that this facilitates periodic review by the Regional Board.
- c. A comprehensive discussion of the compliance record, and the result of any corrective actions taken or planned which may be needed to bring the Discharger into full compliance with the waste discharge requirements.
- d. A map showing the area and elevations in which filling has been completed during the previous calendar year and a comparison to final closure contours.
- e. A written summary of the monitoring results, indicating any changes made or observed since the previous annual report.
- f. An evaluation of the effectiveness of the leachate monitoring/control facilities.

I. PROVISIONS

1. The Discharger shall maintain a copy of this Order at the facility and make it available at all times to facility operating personnel, who shall be familiar with its contents, and to regulatory agency personnel.
2. The Discharger shall comply with all applicable provisions of Title 27 and 40 Code of Federal Regulations Part 258 (Subtitle D) that are not specifically referred to in this Order.

3. The Discharger shall comply with Monitoring and Reporting Program No. R5-2003-0077, which is incorporated into and made part of this Order.
4. The Discharger shall comply with the applicable portions of the *Standard Provisions and Reporting Requirements for Waste Discharge Requirements for Nonhazardous Solid Waste Discharges Regulated by Title 27 and/or Subtitle D (27 CCR §20005 et seq. and 40 CFR 258 et seq.)*, dated April 2000, which are hereby incorporated into this Order.
5. All reports and transmittal letters shall be signed by persons identified below:
 - a. For a corporation: by a principal executive officer of at least the level of senior vice-president.
 - b. For a partnership or sole proprietorship: by a general partner or the proprietor.
 - c. For a municipality, state, federal or other public agency: by either a principal executive officer or ranking elected or appointed official.
 - d. A duly authorized representative of a person designated in a, b or c above if;
 1. the authorization is made in writing by a person described in a, b, or c of this provision;
 2. the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a Unit, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
 3. the written authorization is submitted to the Regional Board.
 - e. Any person signing a document under this Section shall make the following certification:

“I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.”

6. The Discharger shall take all reasonable steps to minimize any adverse impact to the waters of the State resulting from noncompliance with this Order. Such steps shall include accelerated or additional monitoring as necessary to determine the nature, extent, and impact of the noncompliance.
7. The owner of the waste management facility shall have the continuing responsibility to assure protection of waters of the state from discharged wastes and from gases and leachate generated by discharged waste during the active life, closure, and post-closure maintenance period of the Unit(s) and during subsequent use of the property for other purposes.
8. The fact that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this Order shall not be regarded as a defense for the Discharger's violations of the Order.
9. To assume ownership or operation under this Order, the succeeding owner or operator must apply in writing to the Regional Board requesting transfer of the Order within 14 days of assuming ownership or operation of this facility. The request must contain the requesting entity's full legal name, the State of incorporation if a corporation, the name and address and telephone number of the persons responsible for contact with the Regional Board, and a statement. The statement shall comply with the signatory requirements contained in the Standard Provisions and Reporting Requirements and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. Transfer of this Order shall be approved or disapproved by the Regional Board.
10. The Discharger shall establish cost estimates for initiating and completing corrective action for all known or reasonably foreseeable releases from the landfill, and submit these estimates to the Executive Officer for review and approval.
11. The Discharger shall obtain and maintain assurances of financial responsibility for initiating and completing corrective action for all known or reasonably foreseeable releases from the landfill in an amount approved by the Executive Officer, and shall submit the financial assurance mechanism to the Financial Assurances Section of the California Integrated Waste Management Board.
12. The Discharger is required to maintain financial assurance mechanisms for closure and post-closure maintenance costs as specified in Chapter 6 of Title 27. The Discharger is required to submit the financial assurance mechanism to the Financial Assurances Section of the California Integrated Waste Management Board, which determines if the mechanism meets the requirements of Chapter 6, Title 27, and if the amount of coverage is adequate.

13. The Discharger shall conduct a periodic load checking program. The load checking program shall ensure that 'hazardous wastes' and 'designated wastes' are not discharged to any Class III landfill unit at the facility. The program shall also ensure that wastes exceeding moisture limitations are not discharged to landfill units. Results of the load checking program shall be recorded and shall be made available for inspection by Regional Board staff during inspections at the facility.
14. The Discharger shall complete the tasks contained in these waste discharge requirements in accordance with the following time schedule:

<u>Task</u>	<u>Compliance Date</u>
A. Construction Plans	
Submit construction and design plans for Executive Officer review and approval. (see Construction Specification D.2)	Prior to construction
B. Construction Report	
Submit a construction report upon completion of each WMU-2 cell demonstrating construction was in accordance with approved construction plans for Executive Officer review and approval. (see Construction Specification D.10)	Prior to discharge
C. Corrective Action	
Submit progress reports on groundwater remediation and soil vapor extraction	1 April and 1 October of each year

I, THOMAS R. PINKOS, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 25 April 2003.